WHAT IS CLAIMED IS:

1. A pulse discrimination method for discriminating between pulses having a short decay period and a long decay period, comprising:

detecting the pulse;

integrating a rise portion of the pulse;

integrating a decay portion of the pulse; and

comparing the integrated rise portion of the pulse with the integrated decay portion of the pulse to distinguish between a pulse having a long decay period and a pulse having a short decay period.

2. The method of claim 1, further comprising producing an indication for a user of a detected pulse having a long decay period.

3. The method of claim 1, further comprising producing an indication for a user of a detected pulse having a short decay period.

4. A pulse discrimination method for discriminating between pulses produced by a radiation detector, the radiation detector producing pulses having a short decay period in response to gamma radiation, the radiation detector producing pulses having a long decay period in response to neutrons, comprising:

detecting a pulse;

integrating a rise portion of the pulse;

integrating a decay portion of the pulse;

comparing the integrated rise portion of the pulse with the integrated decay portion of the pulse to determine whether the pulse was produced in response to gamma radiation or in response to neutrons.

5. The method of claim 4, further comprising producing an indication for a user that a gamma ray was detected for a pulse having a short decay period.

6. The method of claim 4, further comprising producing an indication for a user that a neutron was detected for a pulse having a long decay period.

7. The method of claim 4, wherein integrating a rise portion of the pulse comprises integrating over a rise time period in the range of about 8 nanoseconds to about 30 nanoseconds.

8. The method of claim 7, wherein the rise time period is about 10 nanoseconds.

9. The method of claim 4, wherein integrating a decay portion of the pulse comprises integrating over a decay time period in the range of about 100 nanoseconds to about 300 nanoseconds.

10. The method of claim 9, wherein the decay time period is about 200 nanoseconds.

11. The method of claim 4, wherein the rise portion of the pulse is defined by a beginning time and an ending time, and wherein the decay portion of the pulse is defined by a beginning time and an ending time, the beginning time of the decay portion of the pulse occurring after the beginning time of the rise portion of the pulse by a delay period.

12. The method of claim 11, wherein the delay period is in the range of about 15 nanoseconds to about 40 nanoseconds.

13. The method of claim 11, wherein the delay period is about 20 nanoseconds.

14. A radiation detector for discriminating between gamma rays and neutrons, comprising:

detector means for producing pulses in response to gamma rays and neutrons; and

pulse discrimination means operatively associated with said detector means for integrating a rise portion of a pulse, integrating a decay portion of the pulse, and

comparing the integrated rise portion of the pulse with the integrated decay portion of the pulse to determine whether the pulse was produced by said detector means in response to a gamma ray or a neutron.

15. The radiation detector of claim 14, wherein said detector means comprises a liquid scintillator detector.

16. The radiation detector of claim 14, wherein said pulse discrimination means comprises:

a constant fraction discriminator operatively associated with said detector, said constant fraction discriminator producing a short gate output signal and a long gate output signal;

a first integrator operatively associated with said detector and said constant fraction discriminator, said first integrator using said short gate output signal to integrate the rise portion of the pulse; and

a second integrator operatively associated with said detector and said constant fraction discriminator, said second integrator using said long gate output signal to integrate the decay portion of the pulse.

17. The radiation detector of claim 16, further comprising a delay circuit operatively associated with said constant fraction discriminator and said second integrator, said delay circuit delaying the long gate output signal.

18. The radiation detector of claim 17, wherein said short gate output signal has a duration of about 10 nanoseconds and wherein said long gate output signal has a duration of about 200 nanoseconds.

19. The radiation detector of claim 18, wherein said delay circuit delays a beginning time of the long gate output signal by about 20 nanoseconds from a beginning time of the short

gate output signal.

20. The radiation detector of claim 16 further comprising a linear fan-out circuit operatively associated with said detector means, said constant fraction discriminator, said first integrator, and said second integrator.